

REMARKS

In accordance with the foregoing, claim 3 is amended and claim 5 is added. No new matter is added. Claims 1, 2, and 4 are cancelled without prejudice. Claims 3 and 5 are pending and under consideration.

CLAIM REJECTIONS UNDER 35 U.S.C. §102

Claims 1-4 are rejected under 35 USC 102(b) as being anticipated by "The Study of Thermochemical . . ." to Dokiya, et al. (hereinafter "Dokiya"). Claims 1, 2, and 4 are cancelled without prejudice. Claim 3 is amended to enhance and place it in U.S. preferred form. No new matter is added.

Independent claim 3 patentably distinguishes over the cited prior art at least by reciting "concentrating the first aqueous solution until a concentration of sulfuric acid is higher than a value reported for a liquid-liquid separation method, which is H_2SO_4 to $4\text{H}_2\text{O}$ in terms of molar ratio."

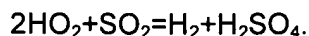
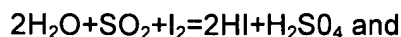
Dokiya describes a reactor in which are introduced a positive electrode solution of sulfuric acid and a negative electrode solution of hydrogen iodide containing iodine. The reactor is divided in a positive electrode portion and a negative electrode portion by an ion exchange membrane. Gaseous SO_2 is introduced in the positive electrode portion to conduct Bunsen reaction and produce sulfuric acid and hydrogen iodide. Sulfuric acid and hydrogen iodide are separately recovered as a positive electrode solution and a negative electrode solution, respectively.

FIG. 10 of Dokiya illustrates the short circuit current vs. elapsed time.

A table under FIG. 10 provides information about experimental conditions for experiments A-D for which results are represented in the figure. The Office Action erroneously associates experiment D with FIG. 11. Claim 3 recites that "a concentration of sulfuric acid is higher than H_2SO_4 to $4\text{H}_2\text{O}$ in terms of molar ratio" which is the same as molar ratio of $\text{H}_2\text{O}/\text{H}_2\text{SO}_4 < 4$. Only experiment D has a molecular ratio of 3.6 lower than 4.

In the conditions of experiment D, the Bunsen reaction is not maintained because the short circuit current is non-zero (negative!) for a brief period and then remains zero. A reaction other than a Bunsen reaction takes place in experiment D of Dokiya. Thus, experiment D actually teaches away from the experimental conditions recited in claim 3. Therefore claim 3 is patentable over Dokiya.

FIG. 11 of Dokiya includes two graphs of potential vs. current for two reactions:



Underneath FIG. 11 are specified the experimental conditions A-C which are illustrated in FIG. 11. "A" experimental conditions correspond to "ohmic drop due to solution and membrane", "B" experimental conditions correspond to "Anodic overvoltage" and "C" experimental conditions correspond to "Cathodic overvoltage." All these three experiments (A-C) are performed for a molecular ratio $\text{H}_2\text{O}/\text{H}_2\text{SO}_4 = 4.5$ which is larger than 4 and as such outside the claimed less than 4.

New claim 5 is fully supported by the originally filed specification, for example, FIG. 4 and page 13, line 24 to page 16, line 13.

Independent claim 5 patentably distinguishes over the cited prior art at least by reciting:

- the aqueous solution of sulfuric acid obtained in the positive electrode portion after the Bunsen reaction is concentrated to be $\text{H}_2\text{SO}_4 + a\text{H}_2\text{O}$ where $a < 4$, and
- the aqueous solution of hydrogen iodide obtained in the negative electrode portion after the Bunsen reaction is concentrated to be $2\text{HI} + b\text{I}_2 + c\text{H}_2\text{O}$, where $b < 8$ and $c < 11$, and the aqueous solution of hydrogen iodide has a concentration in excess of a pseudo-azeotropic composition.

The experimental conditions A-D in FIG. 10 of Dokyia and the molecular ratios related to FIG. 11 of Dokyia do not meet the limitations recited in claim 5. For making it easier to follow the correspondence between the molecular ratios disclosed in Dokyia and the parameters listed in claim 5, Applicants provide the following table:

| | A | B | C | D | FIG.11 |
|--|------|------|------|-----|--------|
| $\text{H}_2\text{O}/\text{H}_2\text{SO}_4$ | 22 | 4.5 | 13 | 3.6 | 4.5 |
| $\text{H}_2\text{O}/\text{HI}$ | 21 | 21 | 5.3 | 13 | 22 |
| $\text{H}_2\text{O}/\text{I}_2$ | 31 | 62 | 20 | 10 | 3.7 |
| $a < 4$ | 22 | 4.5 | 13 | 3.6 | 4.5 |
| $b < 8$ | 1.35 | 0.68 | 0.53 | 2.6 | 11.89 |
| $c < 11$ | 42 | 42 | 10.6 | 26 | 44 |

None of the experiments A-D corresponding to FIG. 10 and FIG. 11 of Dokyia meets the limitations recited in claim 5 (i.e. $a < 4$, $b < 8$ and $c < 11$). Claim 5 clearly recites the cited experimental conditions must be maintained simultaneously ("and").

Thus, claim 5 patentably distinguishes over the cited prior art.

CONCLUSION

There being no further outstanding objections or rejections, it is submitted that the application is in condition for allowance. An early action to that effect is courteously solicited.

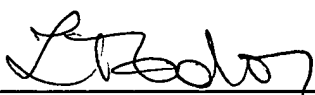
Finally, if there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned to attend to these matters.

If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

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